Relations between geo artifacts in ISCCP cloud data and surface fluxes from the NASA/GEWEX SRB

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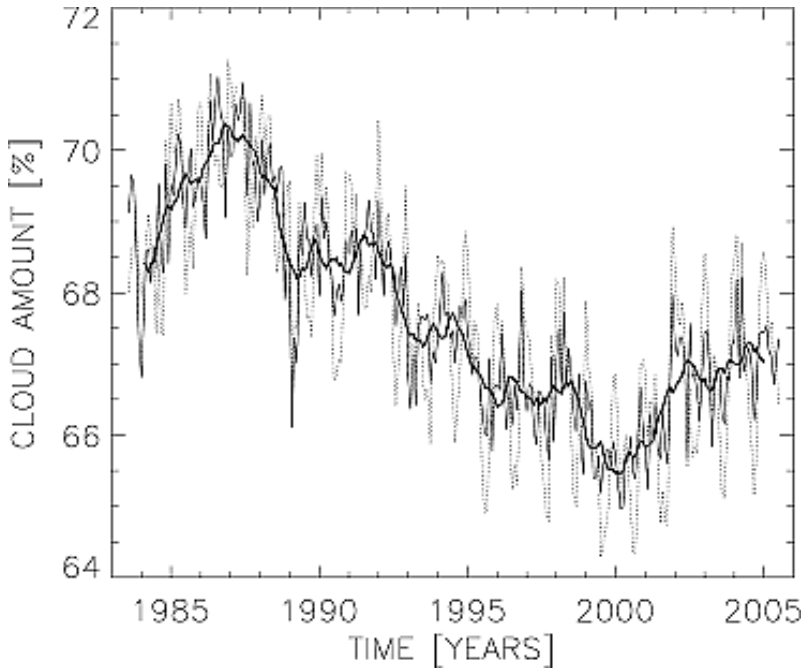
ISCCP Cloud Cover Artifacts

Mean Cloud Amount



Evan, Heidinger, and Vimont, GRL, 2007.

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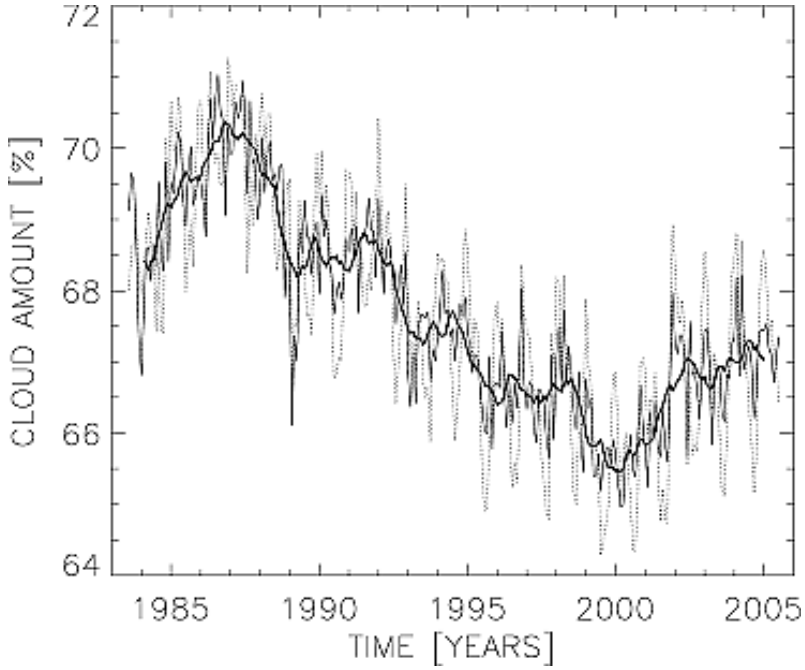
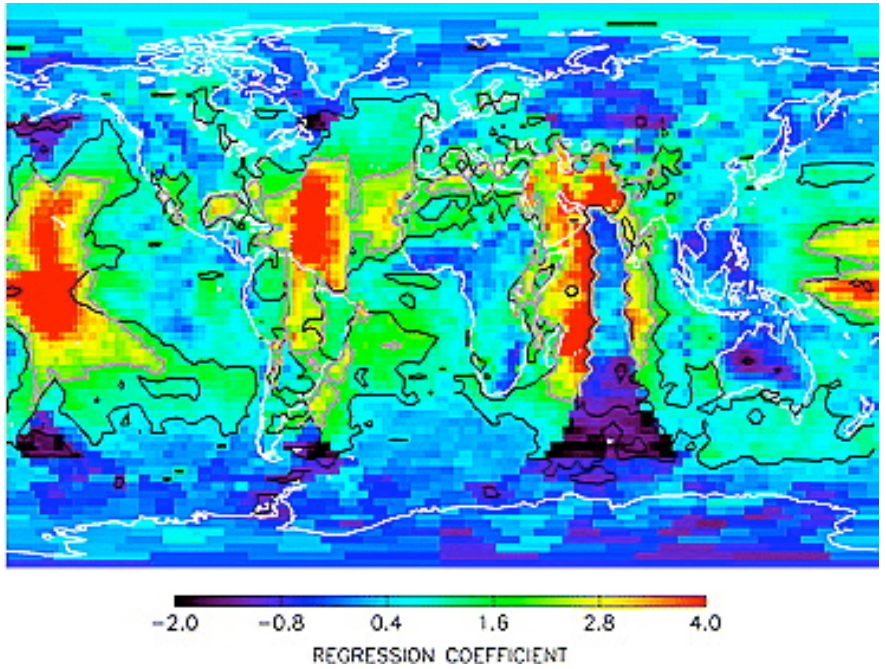


Local Correlation to Mean



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ISCCP Cloud Cover Artifacts

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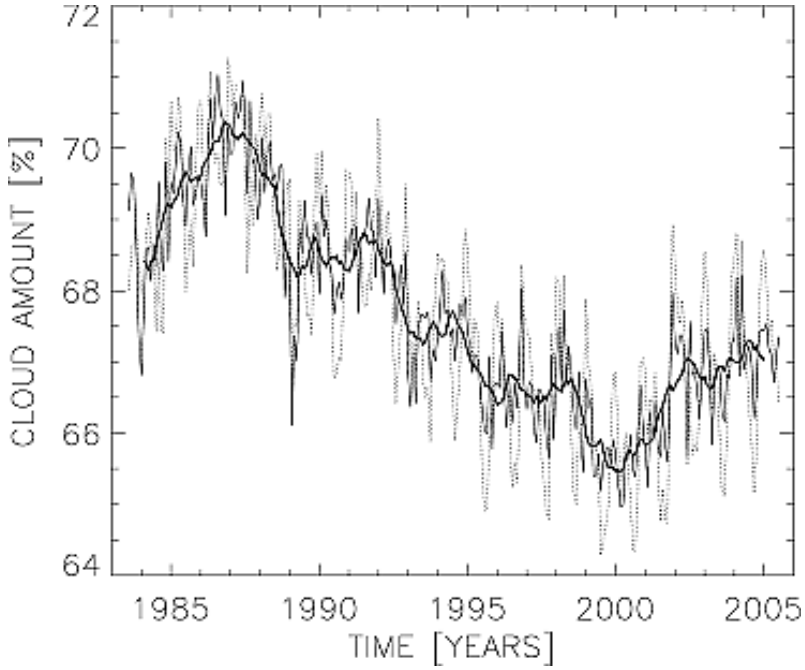

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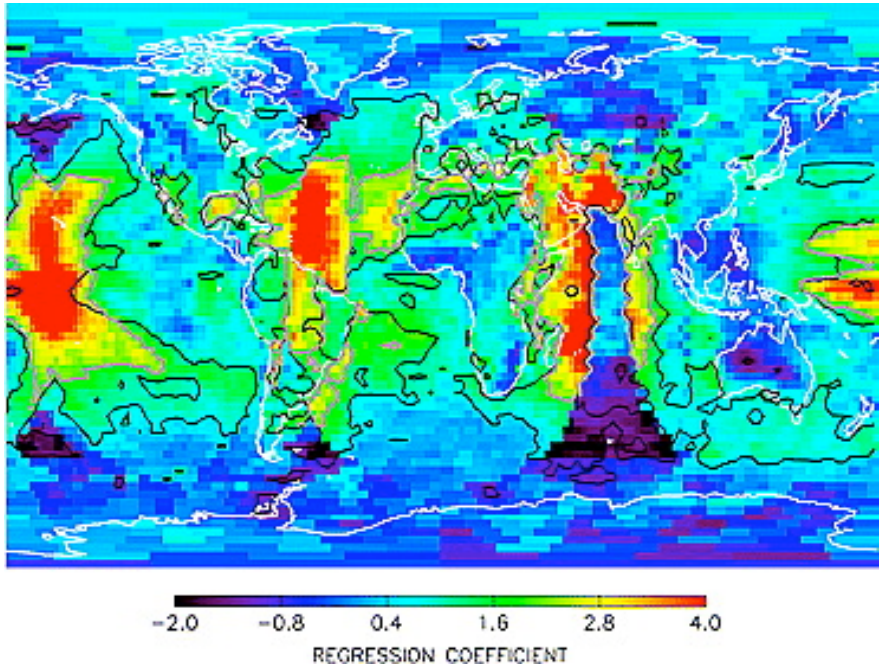

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Strong trend in ISCCP cloud amount closely linked to "geo artifact" area -- trend suspect.

➡ **How does this affect surface radiative flux estimates?**

NASA/GEWEX Surface Radiation Budget (NASA/GEWEX SRB)

Inputs: ISCCP DX radiances and cloud cover

SW retrievals: Modified Pinker/Laszlo algorithm

Produced 3-hourly on a 1° pseudo equal area grid

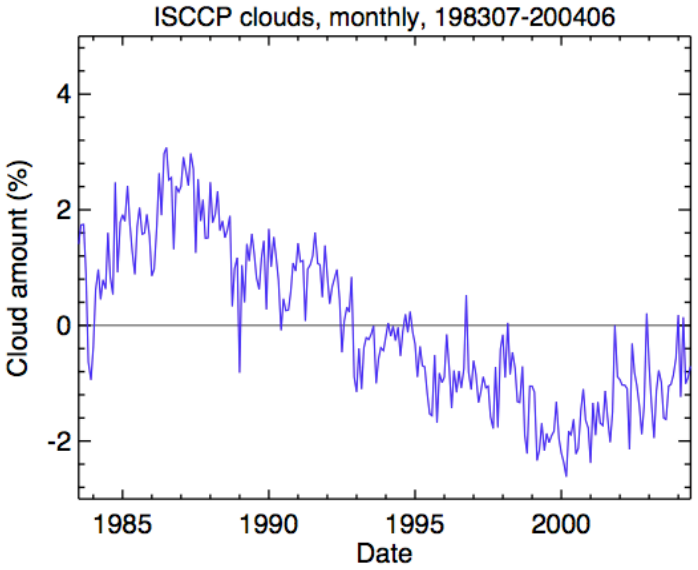
RFA version at 2.5° x 2.5°, monthly means

Version 2.8: July 1983 -- June 2005

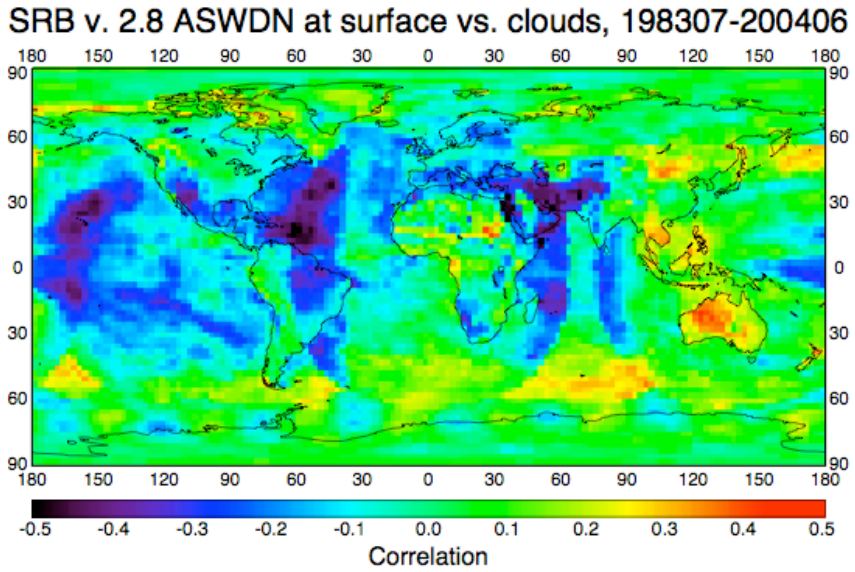
Analyze ISCCP cloud data as processed by SRB.

Correlation to Local All-Sky SW Down

ISCCP Mean Cloud Amount

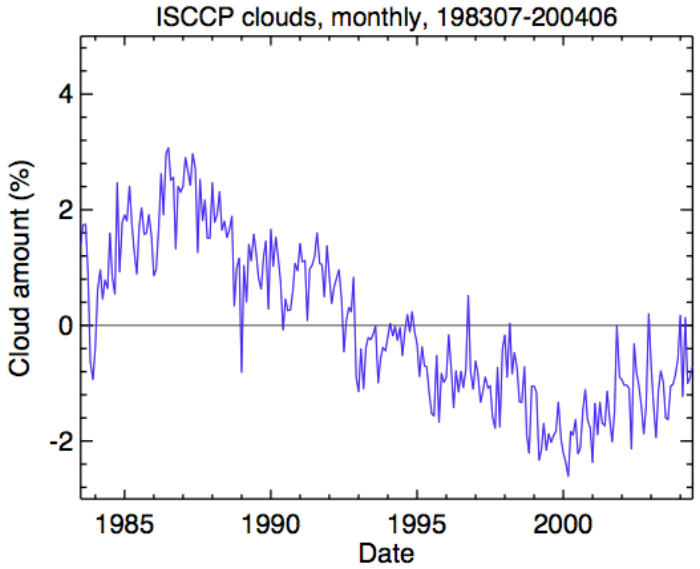


Local Correlation to Mean

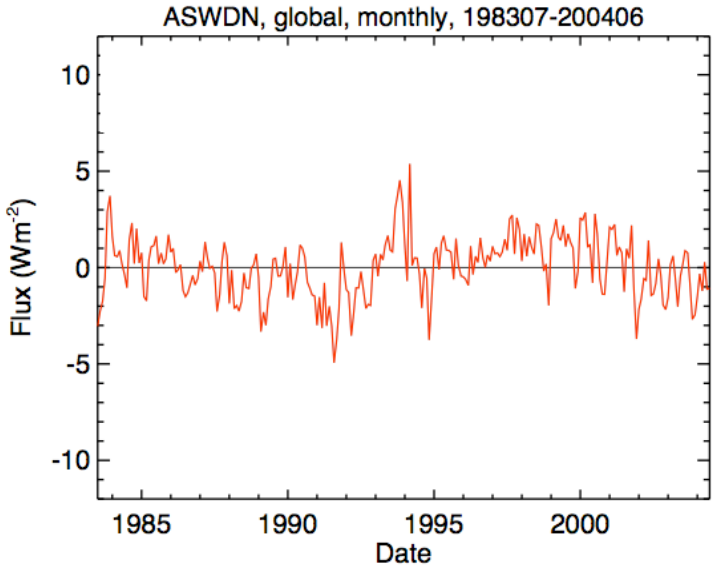


Correlation to Local All-Sky SW Down

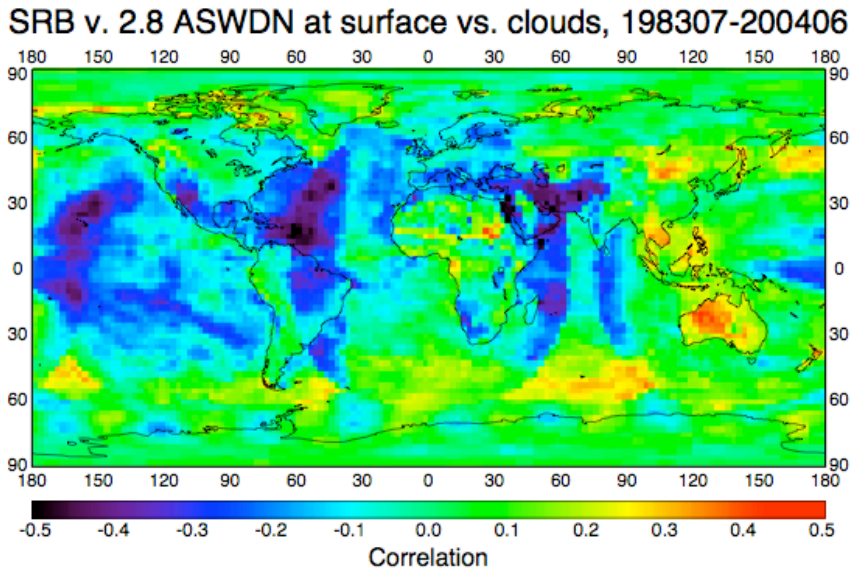
ISCCP Mean Cloud Amount

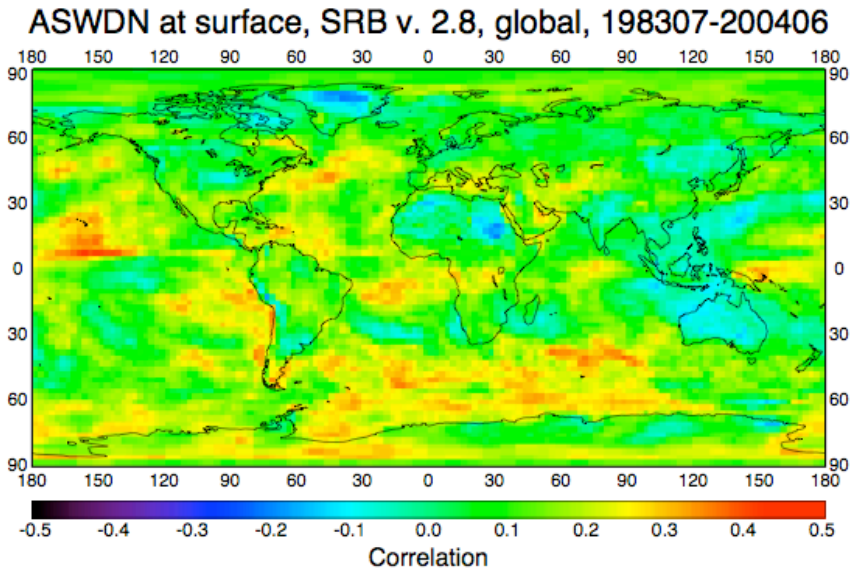


SRB v. 2.8 All-Sky SW Down



Local Correlation to Mean



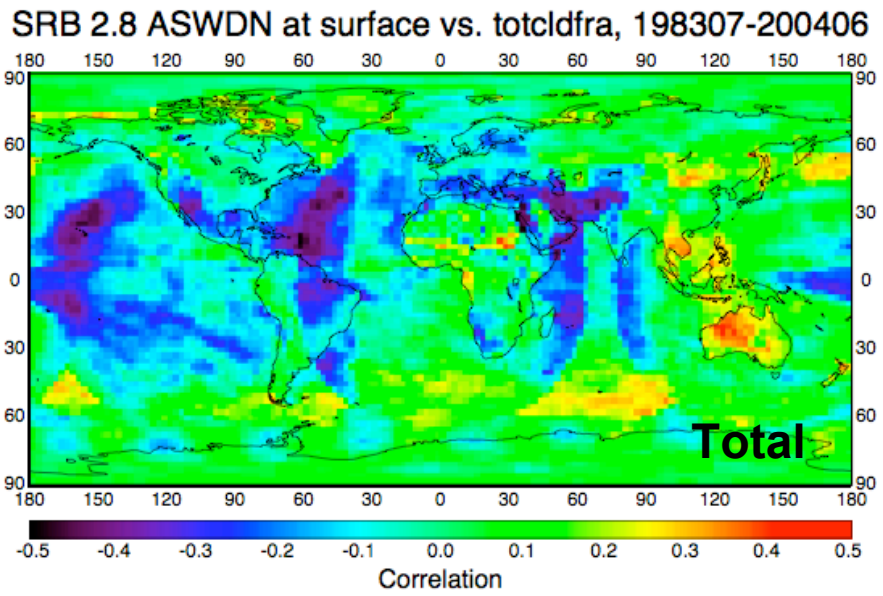


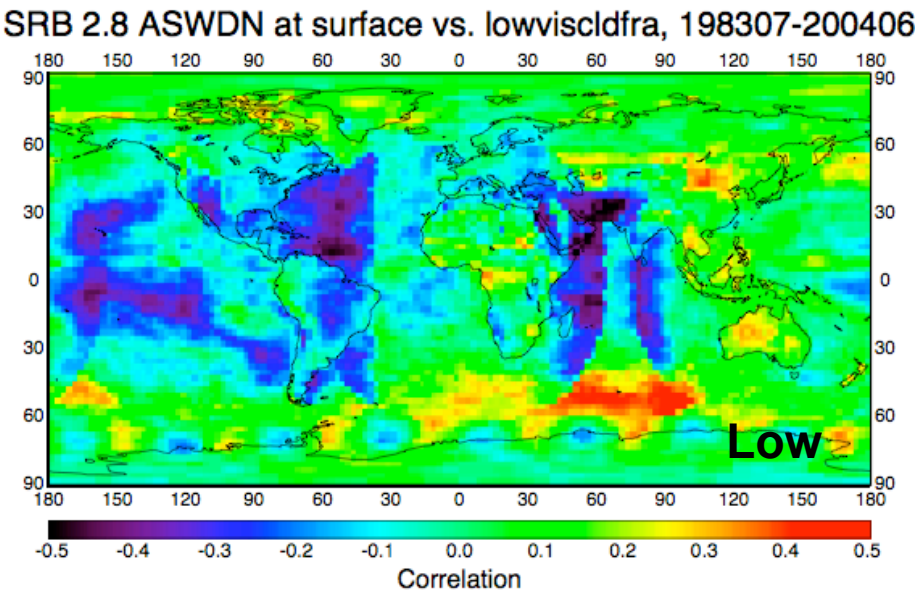
GEWEX SRB Analysis

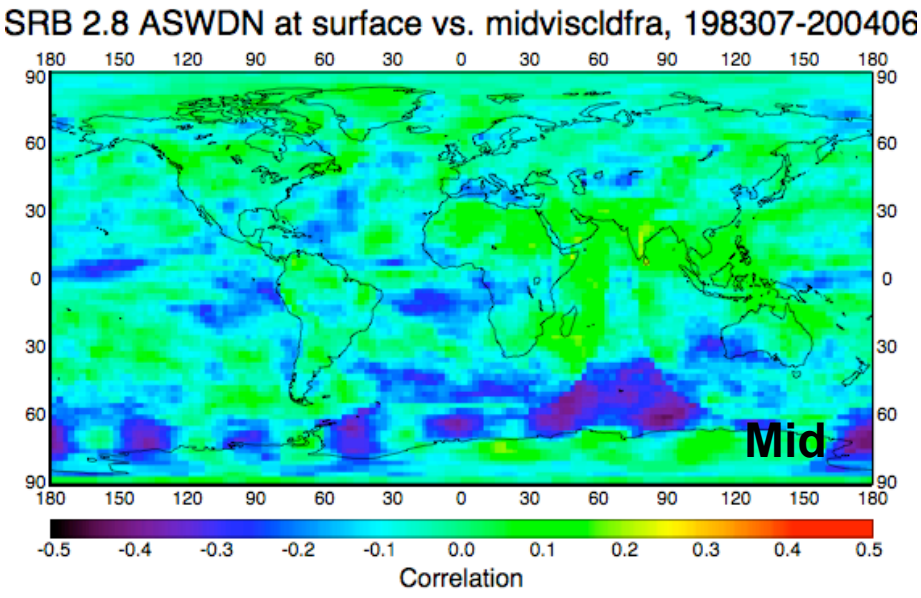
SRB global mean downwelling shortwave flux not dominated by geo artifacts.

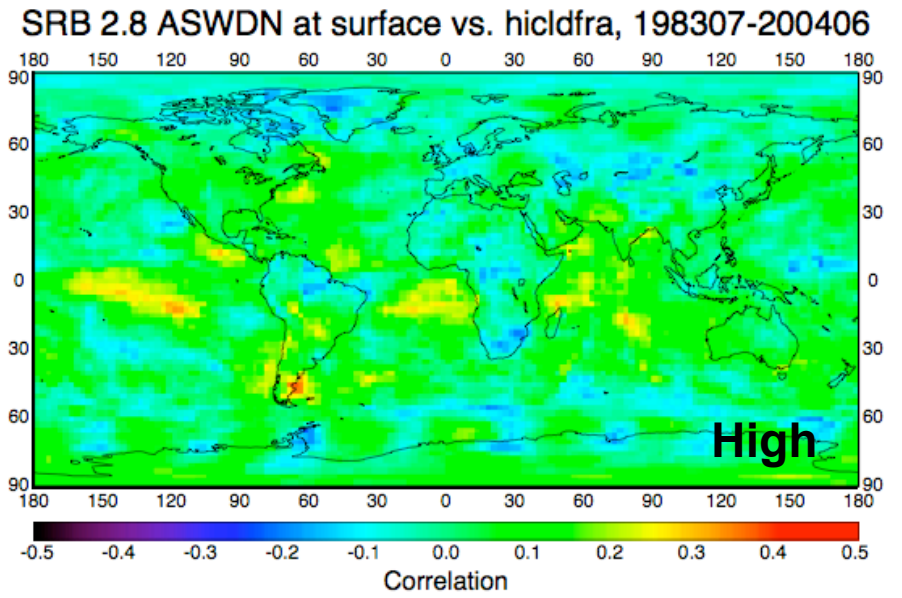
- **Can these differences be explained?**
- **Are long-term SRB trends reliable?**

Correlation of ISCCP Cloud Trends and SRB ASWD

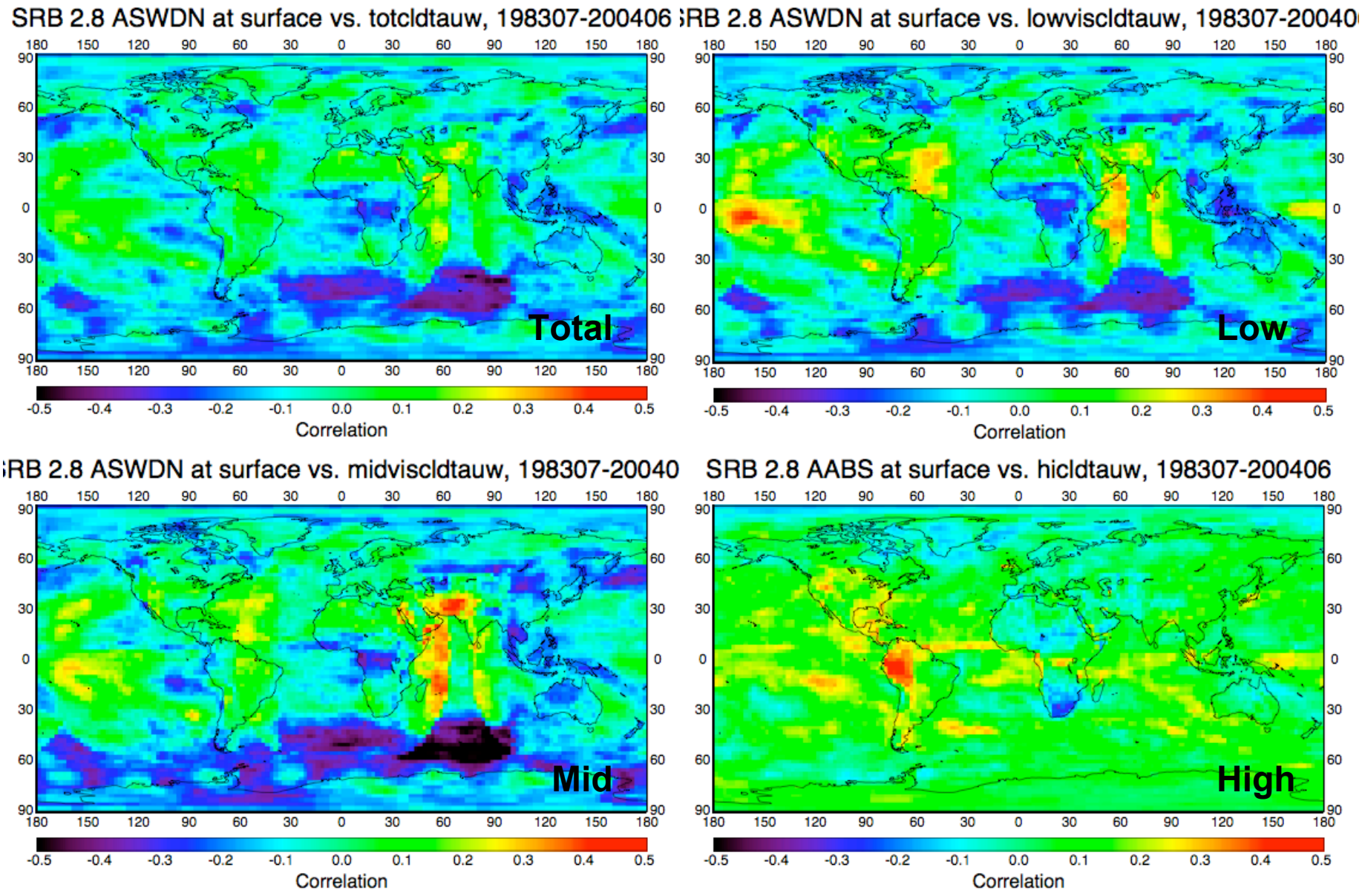








Correlation of ISCCP Clouds and SRB Cloud Tau

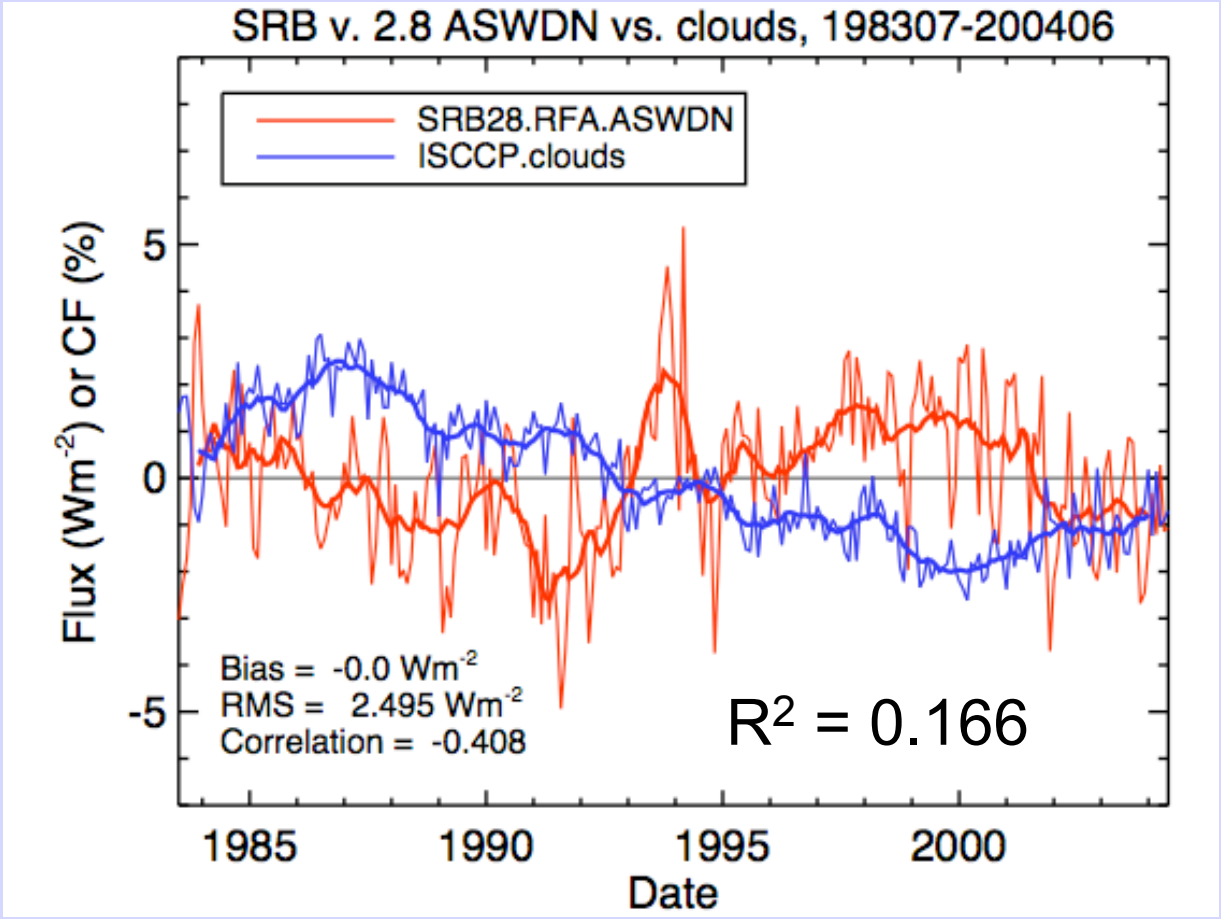


Spatial Flux Analysis

Geoartifact in SRB related to low cloud amount.

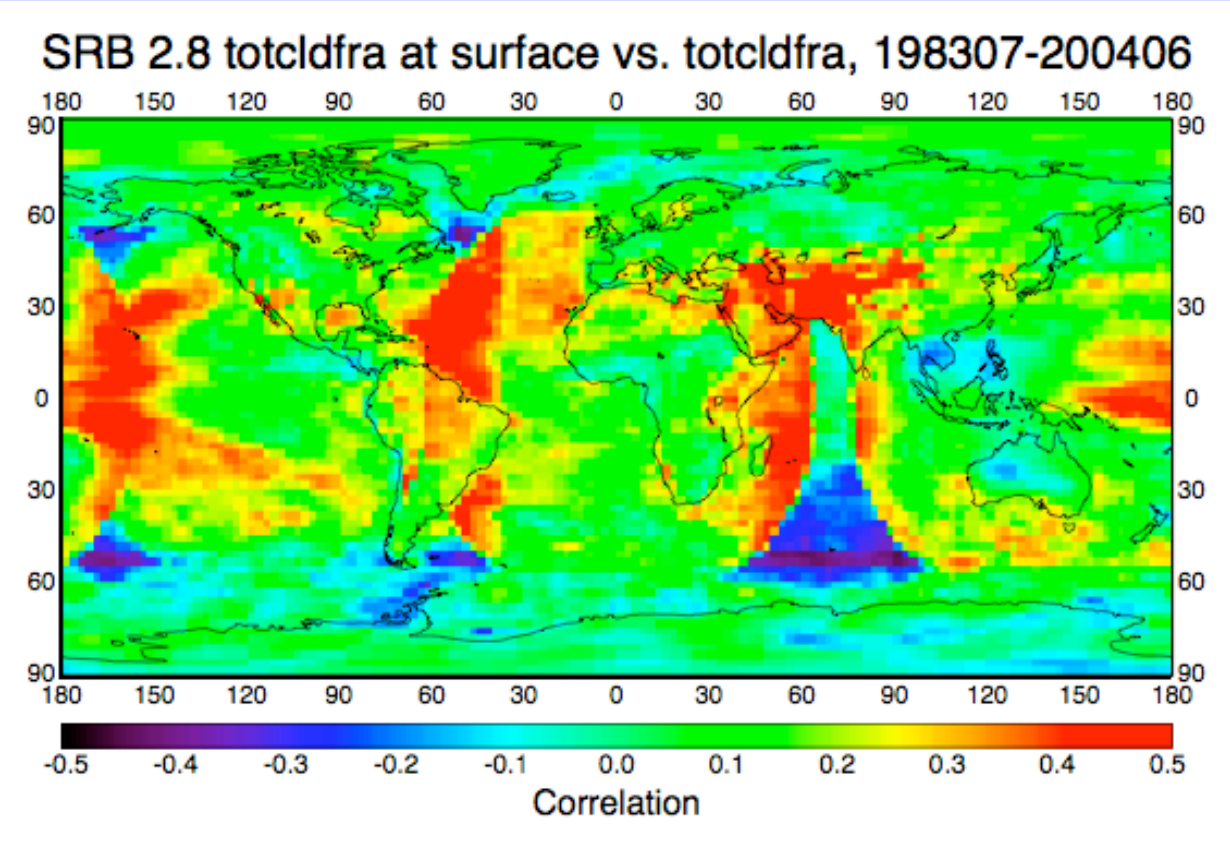
Trends in cloud optical depth oppose cloud amount signal in geo artifact regions.

SRB ASWDN and ISCCP Cloud Amount



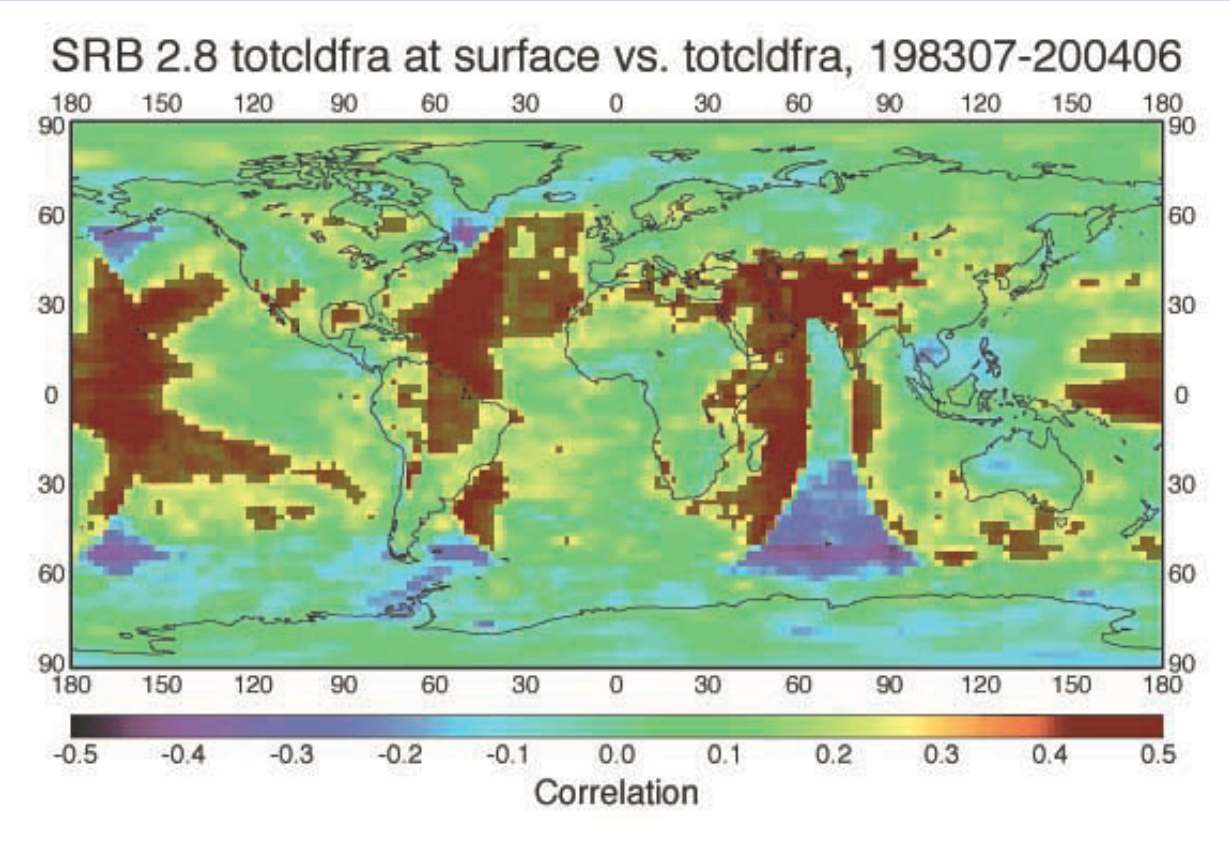
Global mean SRB downwelling shortwave flux and ISCCP cloud amount not tightly correlated.

Selection of “Artifact Area”



Correlation between global mean total cloud amount and local total cloud amount.

Selection of “Artifact Area”



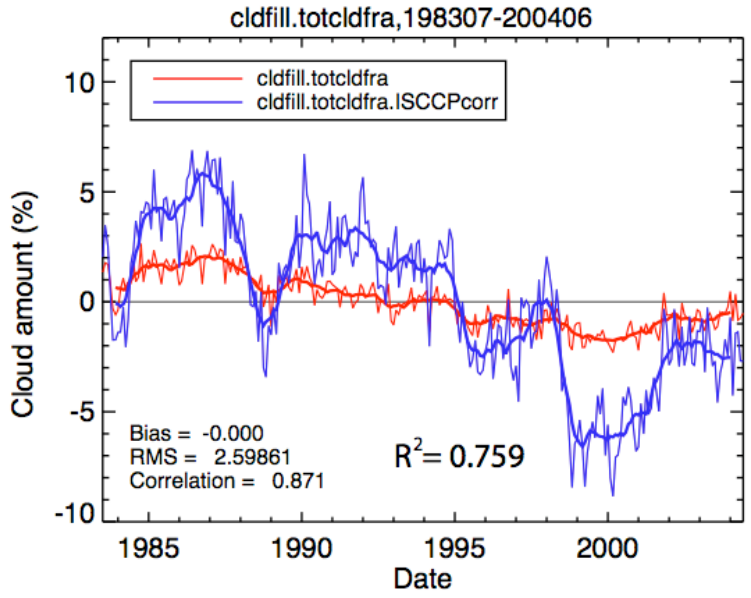
Regions with correlations greater than 0.256 chosen as artifact area.

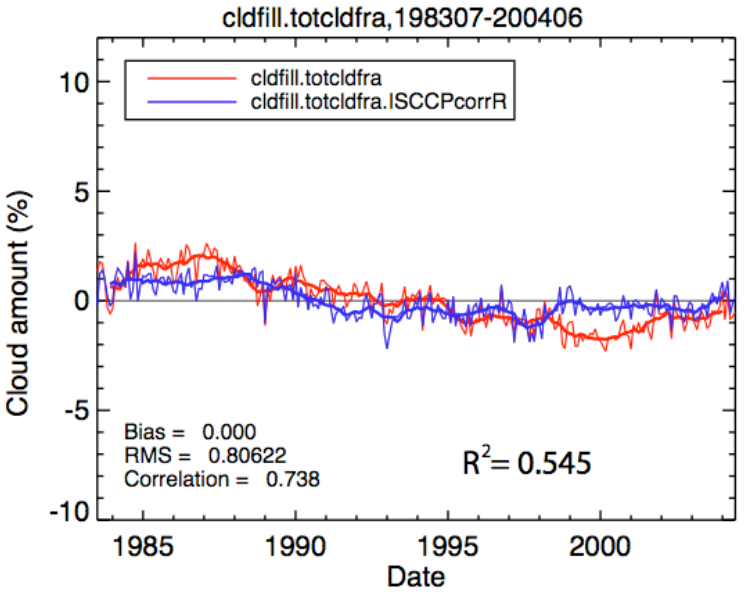
Correlation of Global and Regional Signals

Artifact Region

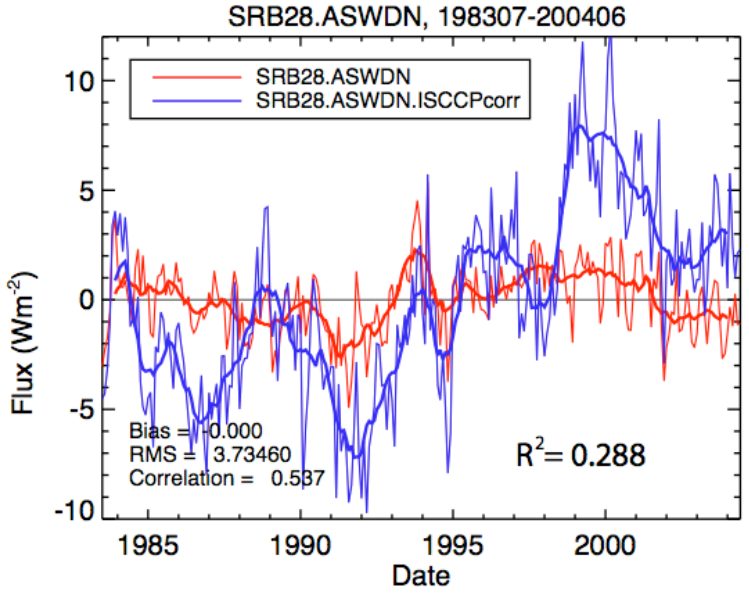
Remaining Area

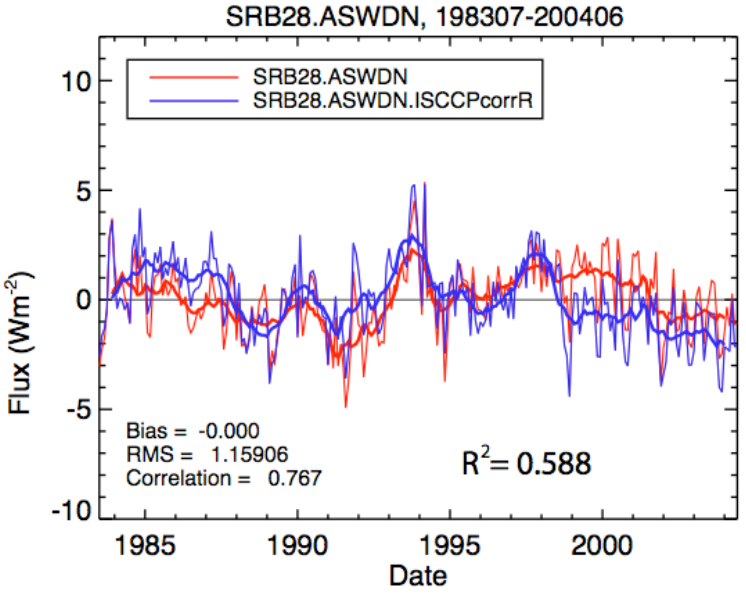
Total Cloud Amount





ASWDN Flux





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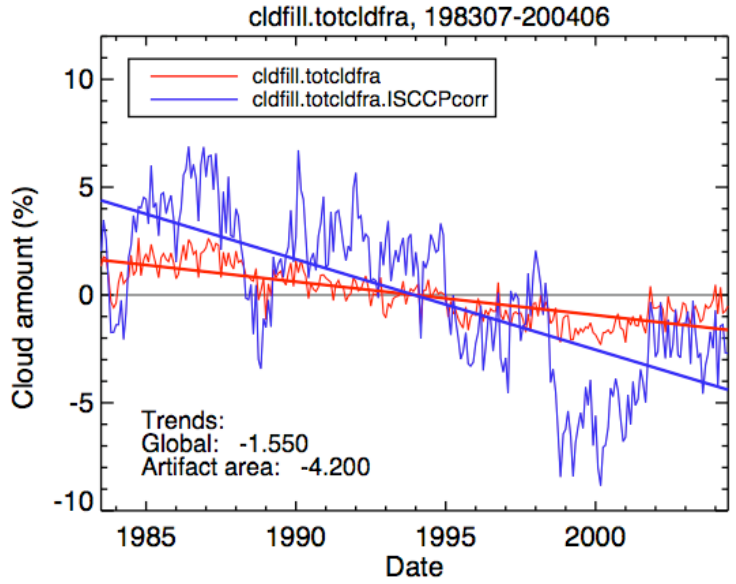

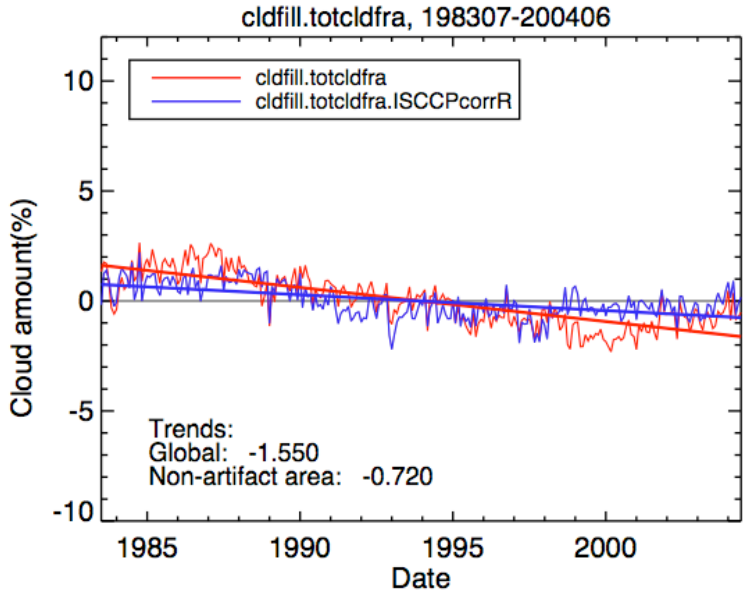

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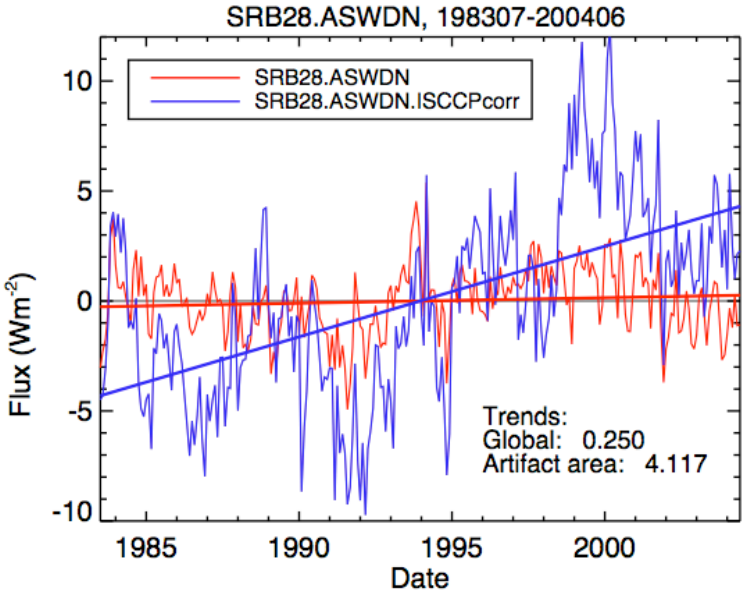

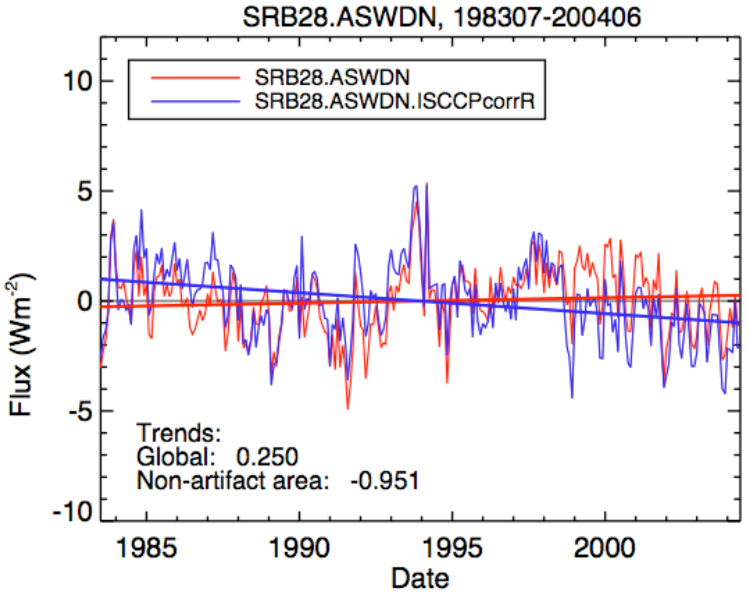

Conclusions

ISCCP cloud record appears to have strong geo artifacts, but effects on SW surface fluxes are mitigated by other factors in flux retrievals.

Nevertheless, fluxes in the artifact area do impact the long-term SW flux trends because the differences between fluxes within and outside this area are large.

More work needed to improve ISCCP record for climate study:

- **Proposal to improve long-term calibration has been funded.**
- **Correction of view-zenith angle effects also needed.**